Title: Bon Voyage!

Brief Overview:

Students plan a trip to Florida to visit a relative. They pack a suitcase based on the total weight of its contents and determine the fractional part of given items based on the total quantity of items. They then plan their trip itinerary based on fractions of available time. Finally, they order decimals while judging a swim meet. The extension activity connects these skills to an in-class contest.

Link to Standards:

- **Problem Solving** Students will demonstrate their ability to solve mathematical problems within the context of planning a trip.
- **Communication** Students will demonstrate their ability to support their decisions orally and in writing.
- **Reasoning** Students will demonstrate their ability to reason mathematically while making choices within given parameters, as well as justifying their arguments.
- **Connections** Students will demonstrate their ability to connect fractions with elapsed time, as well as percents.
- **Number Relationships** Students will demonstrate their ability to describe and apply number relationships using concrete and abstract materials. They will choose appropriate operations and describe effects of operations on numbers.
- **Measurement** Students will estimate and verify measurements. They will apply measurement to real-world problem solving situations.
- **Statistics** Students will demonstrate their ability to collect, organize, and display data and will interpret information obtained from displays.

Grade/Level:

Grade 5

Duration/Length:

This lesson will take approximately 6-7 class periods (45 minutes each).

Prerequisite Knowledge:

Students should have working knowledge of the following skills:

- naming decimals to the hundredths place
- recognizing fractions as parts of a whole
- adding and subtracting fractions
- organizing data and choosing appropriate graphic representation

Objectives:

Students will:

- work cooperatively in pairs.
- collect and organize data from resources and an in-class investigation.
- choose an appropriate operation to solve a problem.
- highlight key information in writing prompts.
- estimate before calculating.
- order decimals to the hundredths place from least to greatest.
- calculate elapsed time.

Materials/Resources/Printed Materials:

- Base 10 blocks or decimal square for pairs or groups of students
- Mr. Potato Head, or other toy with parts
- Stop watches (4-6) that time to hundredths of a second
- Highlighters
- Rulers and graph paper
- TI - 82 calculator (as resource)
- Student and Teacher Resources 1-9
- (Optional) Graph Power computer program OR compasses and protractors

Development/Procedures:

- Present the following scenario to the students:
  Your favorite cousin has asked your family to visit her while she is competing in her first national swim meet. Not only are you excited about seeing her, you've never been to Florida before! You are going to have many responsibilities on this trip. You must pack your suitcase, plan your family's itinerary and be a score-keeper at the meet.

- Help students identify the three main sections of the problem. Inform students that they will be spending approximately two days on each of the parts.

Section 1 - Packing Your Suitcase

- As a class, brainstorm what you need to know to pack appropriately. For example, what will the weather be like, how long will you be staying and what will you be doing.

- Pass out Student Resource #1 and highlight key information needed to complete the task:
  - season is optional, set by teacher
  - length of trip will be 5 days, from Sunday to Thursday
  - weight of the contents of their suitcase cannot exceed 5 lbs.

- Lead a brief discussion about making wise choices about what you need versus what you want to bring.

- Have students work with a partner to complete Student Resource #1. Each student must complete their own list, but can use their partner as a resource.
  - Be sure to point out that students will have to estimate the weight of clothing items not listed on the chart, based on the benchmark weights given.
  - Students must estimate the total weight of their suitcase contents before totaling the actual weight by adding the final column.
  - If students overpacked, instruct them to make adjustments until they do not exceed the weight limit.

- As a review of fractional parts of a whole, bring in a toy such as Mr. Potato Head which has several parts to its whole. As a class, examine the toy with all of its parts intact and then tally the number of individual pieces. Ask students what fraction of the toy is the eyes, ears, arms, etc. (Note to teacher: This is a good opportunity to introduce/revisit percentages.)

- Distribute Student Resource #2 and have students examine the contents of their suitcase as fractional parts of the total number of items packed while answering the questions at the top. See Teacher Resource #3 for sample responses.

- As a class, read and analyze the writing prompt at the bottom of Student Resource #2. Be sure to brainstorm criteria of an excellent persuasive note and create a scoring rubric from this discussion. See Teacher Resource #3 for a sample rubric.

Section 2 - Planning Your Trip

- Before beginning this part, review the concept of elapsed time with the class. As a warm-up, ask students to write individual responses to the following questions:
  - How many hours were you awake yesterday?
  - How much time do you spend at school every day?
  - How much time is there between the time you arrive home after school and the time you go to bed?

- Once you have discussed their responses as a group, introduce Section 2 - Planning Your Trip. Distribute Student Resource #4 and read through the activities together. (This is a good opportunity for you to work on identifying key information in a problem. Highlighters may be helpful.) Students will work on Part I and II in pairs. Depending on the abilities of your students, you may need to work through each portion of the activities as a whole group in order to make sure that the students identify the key information.

- EXTENSION - Construct a circle graph based on the data from Part II. Students must convert their fractions to percents. This is an excellent opportunity to incorporate the computer program Graph Power or have the students construct their graphs using compasses and other hand tools.

  Depending on student needs, the color-cube method for constructing a circle graph may be helpful. First, choose a color of cube to represent each activity (e.g., at meet, sleeping, etc.). The number of cubes of each color should correspond to the data. Next, arrange the cubes in a circle. Then draw radii separating the colors.

Performance Assessment

- "SMART SCHEDULING" - The students will work independently on Student Resource #5 to create a schedule based on the data they have collected. Their work will be on a separate sheet of paper; you may choose to provide copies of a daily/weekly planner as an organizational tool.

- "JOT IT DOWN" - Distribute and analyze the writing prompt on Student Resource #6. As a group, brainstorm and establish criteria for an exceptional response. Students then respond to the prompt individually. See Teacher Resource #7 for a sample rubric.

Section 3 - At the Meet

- Distribute Student Resource #8 and read the scenario at the top as a class. Ask students what they need to do with the data in the chart in order to complete their task. They should realize that it needs to be placed in order from least to greatest.

- If students have extensive experience with ordering decimals to the tenths and hundredths place, they can work in pairs or independently on this entire activity. If not, the following instruction can take place.

Instruction:
- Have students do the familiar ranking of whole numbers, ignoring decimals. They will realize that there are the same whole numbers with different decimal endings.
- Elicit predictions about which order students think represents least to greatest with the decimal extensions, including a verbal explanation of the reasoning behind their responses.
- Using base 10 blocks or decimal squares, set up a system for representing the decimal extensions of numbers that have the same whole number base. For example, you can start by comparing 2.41 and 2.39 by modeling 0.41 and 0.39.
- Provide additional examples as needed before returning to the race data.
- Order all scores from the preliminary race as a class or in groups, and record final places on the chart in Part I A.

- Students complete Part I B and C individually, and Part II A with a partner. See Teacher Resource #9, Part I for sample responses.

- For Part II B, develop a rubric as a class to score the writing prompt. Consider creating gold, silver and bronze categories. See Teacher Resource #9, Part II for a sample rubric.

Extension/Follow Up as Performance Assessment:

Have students collect, organize, and display data based on a "Shoe-Tying Olympics." Make sure students wear shoes with laces on the day of this event!

1. Have students collect data about the shoes they are wearing. For example, how many students:
    - are wearing sneakers? boots? other shoes with laces?
    - tie using one loop? two loops? other?
    - are wearing Reeboks? Nike? Adidas? other?
    - wear shoes with laces often? rarely? never?

2. Analyze this data from a fractional perspective. For example, what fraction of the students wore sneakers? What fraction of students tie using two loops (bunny ears) versus one loop? What fraction of the girls/boys wore sneakers? What fraction of the sneakers are Reebok? Nike? Adidas?
   - Assign groups of students one survey question to analyze and graph. They need to share their data with the class and justify the type of graph they chose.

3. Have students time each other tying one shoe. Establish a set of guidelines to make the contest fair. Students should use a stop watch that records to hundredths of a second to reinforce the activities from Section 3 of the task. Have students rank themselves within groups of 4 or 5, and as a challenge, rank the entire class.

4. Is there a relationship between the fastest lacers and any of the survey questions? For example, are the winners wearing a certain shoe? Do they all tie using one loop?

Authors:

Aimee Cox
Pointers Run Elementary School
Howard County, MD

Daria Franczyk
Carrollton Elementary School
Prince George's County, MD

WEIGH TO GO!

Your favorite cousin has asked your family to visit her while she is competing in her first national swim meet. Not only are you excited about seeing your cousin, you've never been to Florida before! You are going to have many responsibilities on this trip. You must pack your suitcase, plan your family's itinerary, and be a score-keeper at the meet.

Let's start with your suitcase. Since you must carry your own suitcase, your parents decided that the contents of the suitcase can't weigh more than five pounds. Think about what clothing you will need for you daily activities and in which season of the year you are travelling. Also, you will be going on the trip for five days.

1. Decide on items and quantity of each you will be taking. (If you are including items not listed, estimate their weights based on the weight of the given items.)
2. Estimate the weight of the contents of your suitcase.
3. Calculate total weight of each item. (If you bring 4 pairs of shorts, how much will they weigh?)
4. Calculate total weight of suitcase contents.

Quantity	**Item**	**Weight per item, in lbs.**	**Total weight, in lbs.**
____	shorts	$\frac{1}{4}$	_____
____	shirts	$\frac{1}{4}$	_____
____	pants	$\frac{1}{3}$	_____
____	undergarments(per day)	$\frac{1}{8}$	_____
____	_____	_	_____
____	_____	_	_____
____	_____	_	_____
____	_____	_	_____

Total # of items	Estimated total weight of items	Actual total weight of items

SUITCASE WRAP-UP

A. Now that you've finished packing, do you think that have included all the clothing you will need without packing too much? Explain.

_____

_____

_____

B. Please answer the following questions based on your individual data. Be sure to show how you arrived at your answers. You are encouraged to include diagrams to explain your thinking.

1. How many total items are in your suitcase?

2. What fraction of the total items is T-shirts?

3. What fraction of the total items is pants?

4. What fraction of the total is other items listed by you?

5. What would the total weight be if you forgot your shorts?

_____

C. It is Saturday night and you will be leaving for Florida tomorrow morning. Your parents are at work. Before they left, they asked you to pack your belongings for the trip to Florida. You feel confident that you did a good job. **Write your parents a note to persuade them that you made wise choices and didn't go over the weight limit. Be sure to think about the criteria your class brainstormed.**

_____

_____

_____

_____

_____

_____

_____

SUITCASE WRAP-UP*

A. Now that you've finished packing, do you think that have included all the clothing you will need without packing too much? Explain.
Yes, I feel I have included all the clothing that I will need for the five day trip. I packed four shirts and four shorts for Monday through Thursday. I only packed for four days because I would already be wearing my outfit for Sunday when I get in the car. I also brought a pair of pants in case it is cooler weather...

B. Please answer the following questions based on your individual data. Be sure to show how you arrived at your answers. You are encouraged to include diagrams to explain your thinking.

1. How many total items are in your suitcase? **There are 15 items in my suitcase.**

2. What fraction of the total items is T-shirts? **Four-fifteens of the total items is T-shirts**. **I realized that the denominator of the fraction would be the total number of items and T-shirts would be part of that total. I looked at the total number of T-shirts I packed and that was the numerator.**

3. What fraction of the total items is pants?

4. What fraction of the total is other items listed by you?

5. What would the total weight be if you forgot your shorts?

* ***Answers listed above are samples. Student responses will vary based on what each student decided to pack.***

C. It is Saturday night and you will be leaving for Florida tomorrow morning. Your parents are at work. Before they left, they asked you to pack your belongings for the trip to Florida. You feel confident that you did a good job. Write your parents a note to persuade them that you made wise choices and didn't go over the weight limit. Be sure to think about the criteria your class brainstormed.

Sample rubric:

Master Packer:
- **proper note format**
- **opinion clearly stated**
- **opinion supported by 3 specific reasons**
- **math vocabulary incorporated**

Apprentice Packer
- **proper note format**
- **opinion stated**
- **opinion supported by 2 specific reasons**
- **math vocabulary incorporated**

Novice Packer
- **opinion stated**
- **opinion supported by 2 specific reasons**

TACKLING TIME

During the long drive to Florida, you are going to use your problem solving abilities to figure out how much free time you have once you arrive.

Part I

1. You leave Maryland at 7:00 a.m. Sunday and it takes 15 hours to arrive. What time will you get there?

_____

You get up at 7:00 a.m. every day and go to bed at 10:00 p.m. every night. Remember to think about eating! You of course eat 3 meals per day and it takes 1 hour to eat each meal.

2. Monday you will go to the preliminary meet where you must help with the timing of the swimmers. The preliminary meet lasts from 8:00 a.m. to 12:00 p.m. How many hours of free time will you have on Monday? *(Hint: Be sure to remember lunch and dinner!)*

_____

3. There are no swimming events on Tuesday. How many hours of free time will you have that day?

_____

4. The swimming finals are from 12:00 p.m. to 2:00 p.m. on Wednesday. How many hours of free time will have you on Wednesday?

_____

Part II

Complete the following table based on your previous responses and answer the questions below.

Time Spent in Florida

At meet	Eating	Sleeping	Free Time
6 hours			

1. What fraction of your time will be spent eating? _____ at the meet? _____ sleeping? _____

2. What fraction of your time is free for other activities?

_____

SMART SCHEDULING

Using the chart below, decide what you will do during your free time. You may choose to participate in an activity more than once, yet be prepared to explain the choices you make.

Total Amount of Free Time Available _____

Possible Free Time Activities			
Visit Sea World	4 hours	Visit Epcot Center	5 $\frac{1}{4}$ hours
Go to the beach	2 $\frac{1}{2}$ hours	Swim at hotel pool	You choose!
Go to the movies	2 hours	Visit Disney World	6 $\frac{1}{2}$ hours
Read	$\frac{3}{4}$ hours	Go on a walk/hike	1 hour
Nap	$\frac{1}{2}$ hour	Watch TV	You choose!
Listen to music	$\frac{1}{2}$ hour	Other _____	You choose!

Your cousin wants to spend time with you, however, she doesn't know when she is going to be available. **Make a schedule of where you will be and what you will be doing on Monday, Tuesday and Wednesday from the time you wake up (7:00 a.m.) to the time you go to bed (10:00 p.m.) This way, she knows where you are all the time!**

Think about what time you will be eating all three meals, how activities you chose might fit into available time blocks and making each day's activities reasonable. Remember that presentation is important. You will be constructing your schedule on a separate sheet of paper provided by your teacher. You are encouraged to use rulers and/or graph paper.

JOT IT DOWN!

Now that you've completed your schedule for your visit, it's time to start having fun. However, don't forget about your cousin! Along with the schedule, please leave her a note informing her of why you chose certain activities and how you organized the schedule. Be sure to include specific information so that she can easily understand your schedule and your thinking behind it.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Revising and Editing Checklist

☐ Did you use complete sentences?

☐ Did you use proper capitalization and punctuation?

☐ Did you explain why you chose each activity?

☐ Did you explain your schedule?

JOT IT DOWN!

Now that you've completed your schedule for your visit, it's time to start having fun. However, don't forget about your cousin! Along with the schedule, please leave her a note informing her of why you chose certain activities and how you organized the schedule. Be sure to include specific information so that she can easily understand your schedule and your thinking behind it.

Sample rubric:

3
- **proper note format**
- **clearly stated choices and support given for each**
- **complete explanation of schedule**
- **math vocabulary ***

2
- **proper note format**
- **stated choices and some support**
- **explanation of portions of schedule**
- **math vocabulary**

1
- **stated choices and limited support given**
- **explanation of portions of schedule**
- **math vocabulary**

*** Math vocabulary might include hours, fractional parts of time, etc. Discuss this with your students and brainstorm a list of vocabulary encountered during this unit.**

Revising and Editing Checklist

- ☐ Did you use complete sentences?
- ☐ Did you use proper capitalization and punctuation?
- ☐ Did you explain why you chose each activity?
- ☐ Did you explain your schedule?

YOU BE THE JUDGE!

Part I

A. You have been asked to be the score-keeper while your cousin swims the 50 m breaststroke in one of the preliminary heats. You feel a lot of pressure to be an accurate judge. The scores have just come in and you need to determine what place each swimmer came in. Complete the scoring sheet below.

Lane	Time, in sec	Place
1	59.01	_____
2	60.35	_____
3	58.41	_____
4	57.94	_____
5	58.39	_____
6	60.36	_____
7	61.03	_____
8	60.28	_____

B. List the four fastest swimmers below by lane number. They have qualified for the finals!

_____ _____ _____ _____

C. Your cousin was swimming in lane 5. Will she be in the finals? Why or why not?

_____

_____

_____

_____

_____

_____

_____

Part II

You have been chosen to judge the finals since you did a fair job with the preliminaries. This time, you must rank each swimmer **and** award gold (1st), silver (2nd), and bronze (3rd) medals.

A. Complete the following judge's sheet. Check with a fellow judge (a classmate) to ensure that you both have the same results. Adjust your rankings if necessary.

Lane	Time, in sec.	Place	Medal
1	59.89	_____	_____
2	58.54	_____	_____
3	56.59	_____	_____
4	57.03	_____	_____
5	57.10	_____	_____
6	57.04	_____	_____
7	59.73	_____	_____
8	60.02	_____	_____

B. One of the judges does not agree with your ranking. In a note, explain to him/her why each swimmer should be awarded the medal you gave them. Be sure to include a diagram or model to clarify your explanation.

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

YOU BE THE JUDGE!

Part I

A. You have been asked to be the score-keeper while your cousin swims the 50 m breaststroke at one of the preliminary heats. You feel a lot of pressure to be an accurate judge. The scores have just come in and you need to determine what place each swimmer came in.

Lane	Time, in sec	Place
1	59.01	**4**
2	60.35	**6**
3	58.41	**3**
4	57.94	**1**
5	58.39	**2**
6	60.36	**7**
7	61.03	**8**
8	60.28	**5**

B. List the four fastest swimmers below by lane number. They have qualified for the finals!

Lane 4 **Lane 5** **Lane 3** **Lane 1**

C. Your cousin was swimming in lane 5. Will she be in the finals? Why or why not?

Yes, my cousin will be swimming in the finals. She came in second place in the preliminary heat. The first place time was 57.94 sec. and she swam the race in 58.39 sec. She swam 0.45 sec. slower than the first place finisher.

Part II
You have been chosen to judge the finals since you did a fair job with the preliminaries. This time, you must rank each swimmer **and** award gold (1st), silver (2nd), and bronze (3rd) medals.

A. Complete the following judge's sheet. Check with a fellow judge (a classmate) to ensure that you both have the same results. Adjust your rankings if necessary.

Lane	Time, in sec.	Place	Medal
1	59.89	**7**	
2	58.54	**5**	
3	56.59	**1**	**Gold**
4	57.03	**2**	**Silver**
5	57.10	**4**	
6	57.04	**3**	**Bronze**
7	59.73	**6**	
8	60.02	**8**	

B. One of the judges does not agree with your ranking. In a note, explain to him/her why each swimmer should be awarded the medal you gave them. Be sure to include a diagram or model to clarify your explanation.

***Sample rubric*:**

Gold:
- **math vocabulary**
- **labelled diagram**
- **clear and complete explanation of ranking strategy**

Silver:
- **math vocabulary**
- **labelled diagram**
- **adequate explanation of ranking strategy**

Bronze:
- **math vocabulary**
- **diagram**
- **incomplete explanation of ranking strategy**